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EXAMINER	
YEN, ERIC L	

ART UNIT	PAPER NUMBER
2626	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/538,876	GEMELLO ET AL.	
	Examiner	Art Unit	
	ERIC YEN	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-22 and 25-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-20 and 25-33* is/are rejected.

7)☒ Claim(s) *21,22,34 and 35* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. In response to the Office Action mailed 9/12/08, applicant has submitted an amendment and Request for Continued Examination filed 12/11/08.

Claims 14, 25, and 27, have been amended.

Response to Arguments

2. Applicant's arguments with respect to claims 14, 25, and 27, have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 25 recites “skipping a run of the neural network corresponding to the frame or frames between said first and second nonconsecutive frames” in lines 12-13.

While applicant seems to intend the claim scope to mean skipping the neural network runs for any and all frames between the first and second non-consecutive frames, the claim scope also allows for one non-specific frame between non-

consecutive frames separated by 2 or more frames. Therefore, this portion of the claim language has an ambiguity that must be resolved.

For examination purposes, the examiner has interpreted this claim limitation as --skipping runs of the neural network corresponding to all frames between said first and second non-consecutive frames--.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 14 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chigier (US 5,638,487), in view of Cohen et al. (US 5,317,673), hereafter Cohen.

As per Claim 14, Chigier teaches a method of executing a neural network in a speech recognition system for recognizing speech of an input speech signal organized into a series of frame (“speech recognizer… into frames”, col. 4, lines 25-59; “artificial neural network”, col. 5, lines 10-36)

first evaluating a distance between non-consecutive frames (“boundary classifier… generates a network of speech segments [A,B and C]... produces speech segments… would not produce segment C", col. 6, lines 9-38; “only a few frames”, col. 8, lines 47-57; “first stage classifier… ANN… output of first stage classifier is a vector of

two probabilities… boundary frame... interior frame", col. 6, line 49 – col. 7, line 5; Figure 3A; where the segments A, B, and C have lengths that constitute distances between the boundary frames. Determining that segment A should be generated instead of segment C determines a length of segment A, which is a distance between boundaries I and II. Boundaries are non-consecutive frames and determining the location of a boundary relative to another boundary frame ["boundary classification for frame N and the boundary probability classifications of one or more frames from either side of frame N", col. 6, line 49 – col. 7, line 5] evaluates the distance between two boundaries)

running the neural network in correspondence to at least one frame between said non-consecutive frames ("adjusts its weights to reduce its error… minimize", col. 8, lines 12-33; "few frames from the middle of the phonemes are used in training… training is completed", col. 8, lines 47-57)

calculating said distance as a distance between output likelihoods of said neural network (boundary classifier… generates a network of speech segments [A,B and C]... produces speech segments… would not produce segment C", col. 6, lines 9-38; "only a few frames", col. 8, lines 47-57; "first stage classifier… ANN… output of first stage classifier is a vector of two probabilities… boundary frame... interior frame", col. 6, line 49 – col. 7, line 5; Figure 3A; where the segments represent the distance between two frames given output probabilities from the neural network).

Chigier fails to teach skipping runs.

Cohen teaches skipping runs ("back propagation processing… until a desired minimum error is achieved", col. 8, lines 22-47; where stopping the iterative training "skips" a training "run" of the network, and the training is based on the inputs, which in Chigier are the interior frames between the boundary frames).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Chigier to include the teaching of Cohen of skipping runs, in order to not perform unnecessary calculation after optimization is completed, as described by Cohen (col. 8, lines 22-47).

As per Claim 27, its limitations are similar to those in Claim 14, and so is rejected under similar rationale.

7. Claims 15, 17, 28, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chigier, in view of Cohen, as applied to Claims 14 and 27, above, and further in view of Moshier (US 4,489,434).

As per Claim 15, Chigier teaches buffering a plurality of input frames ("speech recognizer… into frames", col. 4, lines 25-59; "artificial neural network", col. 5, lines 10-36)

defining an interval corresponding initially to a main interval of frames delimited by a first and a second non-consecutive buffered frames ("boundary classifier… generates a network of speech segments [A,B and C]... produces speech segments…

would not produce segment C", col. 6, lines 9-38; “only a few frames”, col. 8, lines 47-57; “first stage classifier… ANN… output of first stage classifier is a vector of two probabilities… boundary frame... interior frame”, col. 6, line 49 – col. 7, line 5; Figure 3A)

calculating, by means of said neural network, a first and a second likelihood corresponding to frames delimiting said interval (“boundary classifier… generates a network of speech segments [A,B and C]... produces speech segments… would not produce segment C", col. 6, lines 9-38; “only a few frames”, col. 8, lines 47-57; “first stage classifier… ANN… output of first stage classifier is a vector of two probabilities… boundary frame... interior frame”, col. 6, line 49 – col. 7, line 5; Figure 3A)

calculating a distance between said first and second likelihoods (“boundary classifier… generates a network of speech segments [A,B and C]... produces speech segments… would not produce segment C", col. 6, lines 9-38; “only a few frames”, col. 8, lines 47-57; “first stage classifier… ANN… output of first stage classifier is a vector of two probabilities… boundary frame... interior frame”, col. 6, line 49 – col. 7, line 5; Figure 3A; where, as discussed above, determining what constitutes a particular segment determines the frames and number of frames in that segment which determines a distance between two boundary frames)

calculating, by means of said neural network, at least one other likelihood corresponding to at least one other frame within said interval (“boundary classifier… generates a network of speech segments [A,B and C]... produces speech segments… would not produce segment C", col. 6, lines 9-38; “only a few frames”, col. 8, lines 47-

57; “first stage classifier… ANN… output of first stage classifier is a vector of two probabilities… boundary frame... interior frame”, col. 6, line 49 – col. 7, line 5; Figure 3A)

and applying steps recursively to each interval present as a sub-interval within said main interval containing at least one frame whose likelihood has not been yet calculated, until all the likelihoods corresponding to the frames in said main interval have been calculated (“boundary classifier… generates a network of speech segments [A,B and C]... produces speech segments… would not produce segment C", col. 6, lines 9-38; “only a few frames”, col. 8, lines 47-57; “first stage classifier… ANN… output of first stage classifier is a vector of two probabilities… boundary frame... interior frame”, col. 6, line 49 – col. 7, line 5; Figure 3A; where the likelihoods of all frames are determined by the classifier).

Chigier, in view of Cohen, fails to teach calculating a time distance between said first and second likelihoods, comparing said distance with a threshold value and, in case said distance is lower than said threshold value, calculating by interpolation between said first and second likelihoods, at least one likelihood corresponding to at least one frame within said interval, or where the calculating, by means of said neural network at least one other likelihood corresponding to at least one other frame within said interval, is done in response to said time distance being greater than the threshold.

Moshier suggests calculating a time distance between said first and second likelihoods, comparing said distance with a threshold value and, in case said distance is lower than said threshold value, calculating by interpolation between said first and

second likelihoods, at least one likelihood corresponding to at least one frame within said interval, or where the calculating, by means of said neural network at least one other likelihood corresponding to at least one other frame within said interval, is done in response to said time distance being greater than the threshold ("two decisions… selects the best of the… detections", col. 18, lines 56-63; where "too short a time interval" teaches where one of the decisions should actually be another in the event of a false alarm. Changing the false decision to the correct decision is a form of interpolation because it is based on a neighboring decision, which suggests the use of other neighboring decisions to ensure accuracy. Since this is done in response to decisions occurring too close to each other, it does not apply for durations that are not [i.e., greater than the threshold]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to modify Chigier, in view of Cohen, to include the teaching of Moshier of calculating a time distance between said first and second likelihoods, comparing said distance with a threshold value and, in case said distance is lower than said threshold value, calculating by interpolation between said first and second likelihoods, at least one likelihood corresponding to at least one frame within said interval, or where the calculating, by means of said neural network at least one other likelihood corresponding to at least one other frame within said interval, is done in response to said time distance being greater than the threshold, in order to prevent false alarms from corrupting analysis, as described by Moshier (col. 18, lines 56-63).

As per Claim 28, its limitations are similar to those in Claim 15, and so is rejected under similar rationale.

As per Claim 17, Chigier teaches wherein said main interval of frames comprises said plurality of buffered input frames ("speech recognizer… into frames", col. 4, lines 25-59; "artificial neural network", col. 5, lines 10-36).

As per Claim 30, its limitations are similar to those in Claim 17, and so is rejected under similar rationale.

1. Claims 16, 29, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chigier, in view of Cohen and Moshier, as applied to claims 15 and 27 above, and further in view of Chen (US 4,379,949).

Consider claim 16: Chigier, in view of Cohen and Moshier, do not specifically disclose interpolating, however Chen discloses a linear interpolation **(see Col. 5, lines 21-45, where Chen discusses a linear interpolation)**.. It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Chigier, in view of Cohen and Moshier, and use interpolating as taught by Chen, thus reducing the bandwidth necessary, as discussed by Chen **(see Col. 3, lines 27-38)**.

As per Claim 29, the limitations are similar to those in Claim 16, and so are rejected under similar rationale.

2. Claims 18, 19, 31-32, are rejected under 35 U.S.C. 103(a) as being unpatentable over Chigier, in view of Cohen and Moshier, as applied to claim 15 and 27 above, and further in view of Takahashi (US 6,064,958).

Consider claim 18 Chigier, in view of Cohen and Moshier,disclose likelihoods are probabilities.

Chigier, in view of Cohen and Moshier,do not specifically disclose probability distributions, however Takahashi discloses probability distributions **(see Col. 14, lines 55-65, where Takahashi discusses a distribution)**. It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Chigier, in view of Cohen and Moshier,, and use probability distributions as taught by Takahashi, thus providing pattern recognition using probabilistic models, as discussed by Takahashi **(see Col. 4, line 65- Col. 5, line 10)**.

Consider claim 19: Chigier, in view of Cohen and Moshier,and Takahashi disclose distance between said first and second likelihoods is calculated as a symmetric Kullback distance between probability distributions **(see Col. 14, lines 55-65, where Takahashi discusses Kallback information)**.

As per Cliams 31-32, their limitations are similar to those in Claims 18-19, and so are rejected under similar rationale.

3. Claims 20 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chigier, in view of Cohen and Moshier, applied to claims 15 and 27 above, and further in view of Huang (US 6,801,895).

Consider claims 20 and 33: Chigier, in view of Cohen and Moshier,disclose threshold value is a fuzzy set.

Chigier, in view of Cohen and Moshier, do not specifically disclose a fuzzy set, however Huang discloses a fuzzy set **(see Col. 6, lines 44-67, where Huang discusses a fuzzy threshold)**. It would have been obvious to one skilled in the art at the time the invention was made to modify the invention of Chigier, in view of Cohen and Moshier, and use a fuzzy set as taught by Huang, thus simplifying a process, as discussed by Huang **(see Col. 2, lines 11-17)**.

Allowable Subject Matter

1. Claims 21, 22 and 34-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

8. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not teach skipping runs of the neural network corresponding to all frames between the first and second non-consecutive frames when

a distance between a first and second likelihood, where the two likelihoods are obtained by a neural network, is lower than a threshold, and then calculating the frame or frames between the first and second non-consecutive buffered frames.

Therefore, Claim 25 and dependent claim 26 contains allowable subject matter but is not allowable due to the 112, 2nd paragraph rejection described above.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIC YEN whose telephone number is (571)272-4249. The examiner can normally be reached on M-F 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on 571-272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

EY 2/7/09
/Patrick N. Edouard/
Supervisory Patent Examiner, Art Unit 2626